National Institute of Environmental Health Sciences

Marine mammals as sentinel species for oceans and human health

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Abstract:

The long-term consequences of climate change and potential environmental degradation are likely to include aspects of disease emergence in marine plants and animals. In turn, these emerging diseases may have epizootic potential, zoonotic implications, and a complex pathogenesis involving other cofactors such as anthropogenic contaminant burden, genetics, and immunologic dysfunction. The concept of marine sentinel organisms provides one approach to evaluating aquatic ecosystem health. Such sentinels are barometers for current or potential negative impacts on individual- and population-level animal health. In turn, using marine sentinels permits better characterization and management of impacts that ultimately affect animal and human health associated with the oceans. Marine mammals are prime sentinel species because many species have long life spans, are long-term coastal residents, feed at a high trophic level, and have unique fat stores that can serve as depots for anthropogenic toxins. Marine mammals may be exposed to environmental stressors such as chemical pollutants, harmful algal biotoxins, and emerging or resurging pathogens. Since many marine mammal species share the coastal environment with humans and consume the same food, they also may serve as effective sentinels for public health problems. Finally, marine mammals are charismatic megafauna that typically stimulate an exaggerated human behavioral response and are thus more likely to be observed.

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Resource Description

Early Warning System: ☑

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure : ☑

weather or climate related pathway by which climate change affects health

Food/Water Quality

Food/Water Quality: Biotoxin/Algal Bloom, Chemical, Pathogen

Geographic Feature: ☑

resource focuses on specific type of geography

Ocean/Coastal

Geographic Location: ☒

resource focuses on specific location

Global or Unspecified

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Cancer, Infectious Disease

Infectious Disease: Foodborne/Waterborne Disease, Zoonotic Disease

Foodborne/Waterborne Disease: Leptospirosis, Marine Toxin Syndrome

Zoonotic Disease: Brucellosis, Other Zoonotic Disease

Zoonotic Disease (other): lobomycosis

Resource Type: ☒

format or standard characteristic of resource

Review

Timescale: ☒

time period studied

Time Scale Unspecified